Robins AFB
1997
Environmental
Excellence
Award Winner
Restoration Advisory Board

Welco
me

Restoration Advisory Board Meeting Robins Air Force Base

8 March 2001

Welcome and Program Introduction

Mr. Steven W. Coyle
Installation Co-Chair

Wellhead Protection Planning at Robins Air Force Base

Mr. Paul Koch - Pacific Environmental Services

Mr. Sam Shannon - CH2M HILL

Where Does Robins AFB Obtain Drinking Water ?

- Deep, confined Blufftown Aquifer
- Six active drinking water wells
- Water receives treatment at wellhead

Why Protect A Wellhead?

- What is a wellhead?
- Remove “accidents” waiting to happen
- Once groundwater is contaminated, difficult to clean up
- Less expensive than new well

Wellhead Protection Plans (WHPP)

- Truly an OUNCE of prevention!
- Plans are simply proactive measures to maintain Robins AFB drinking water quality
- Plans conform to GA EPD requirements and DoD guidance

Major Elements of a WHPP

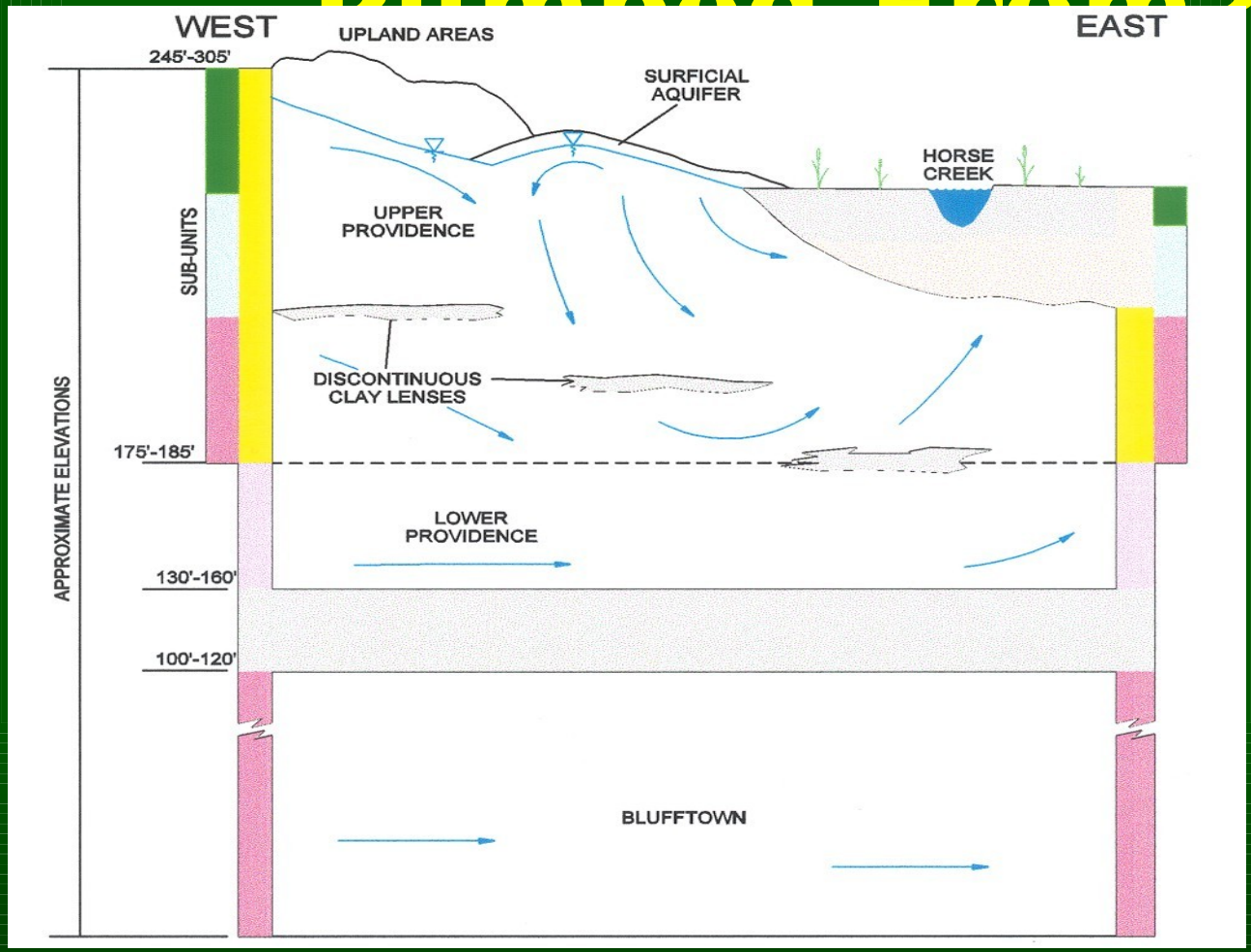
- Identify Control Zone
- Identify Management Zone
- Inventory potential pollution sources
- Develop management plan for potential sources
- Submit contingency plan

One Plan, Six Wells

- Robins AFB to prepare one WHPP document which covers all six wells

- Today presenting Water Supply Well #1 (WS-1)
  - 370 ft deep
  - Pumps 1,200 gpm
  - Located in Base industrial area
  - Surrounded by asphalt and grass

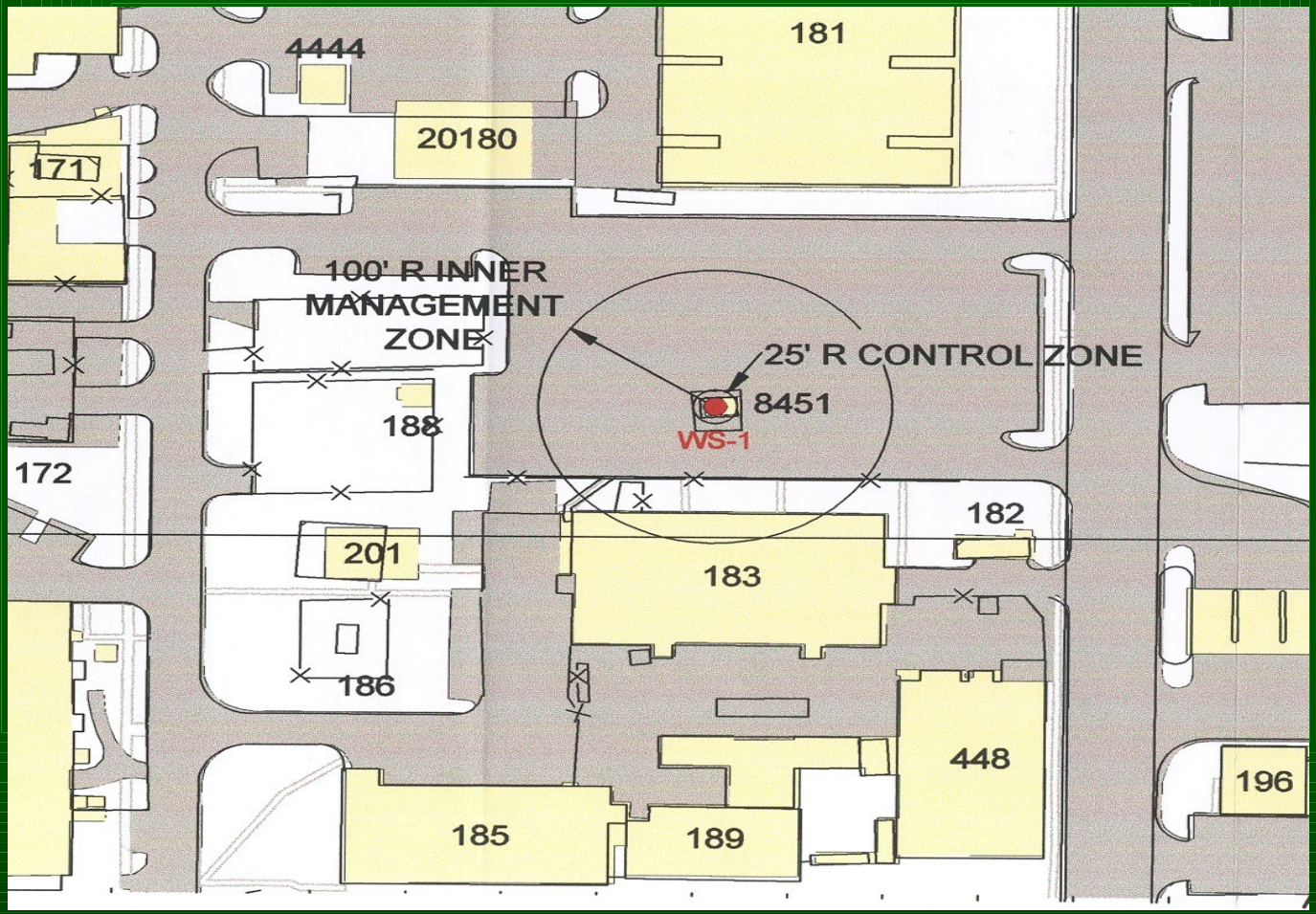
Where is WS-1's Water Pumped From?



Protection Zones Set at Land Surface

- Control Zone (CZ)
  - 15 ft for paved surfaces
  - 25 ft for unpaved surfaces
  - must be fenced
  - water treatment chemicals only
- Inner Management Zone (IMZ)
  - 100 ft for all wells in confined aquifers
- Outer Management Zone (OMZ)
  - GA EPD does not require for coastal plain

WS-1 has CZ and IMZ



WS-1 is Adequately Protected

- Confining zones
- Fences
- Partial pavement
- Double-walled aboveground storage tank
- Remote chemical storage

How to Keep WS-1's Water Clean in Future?

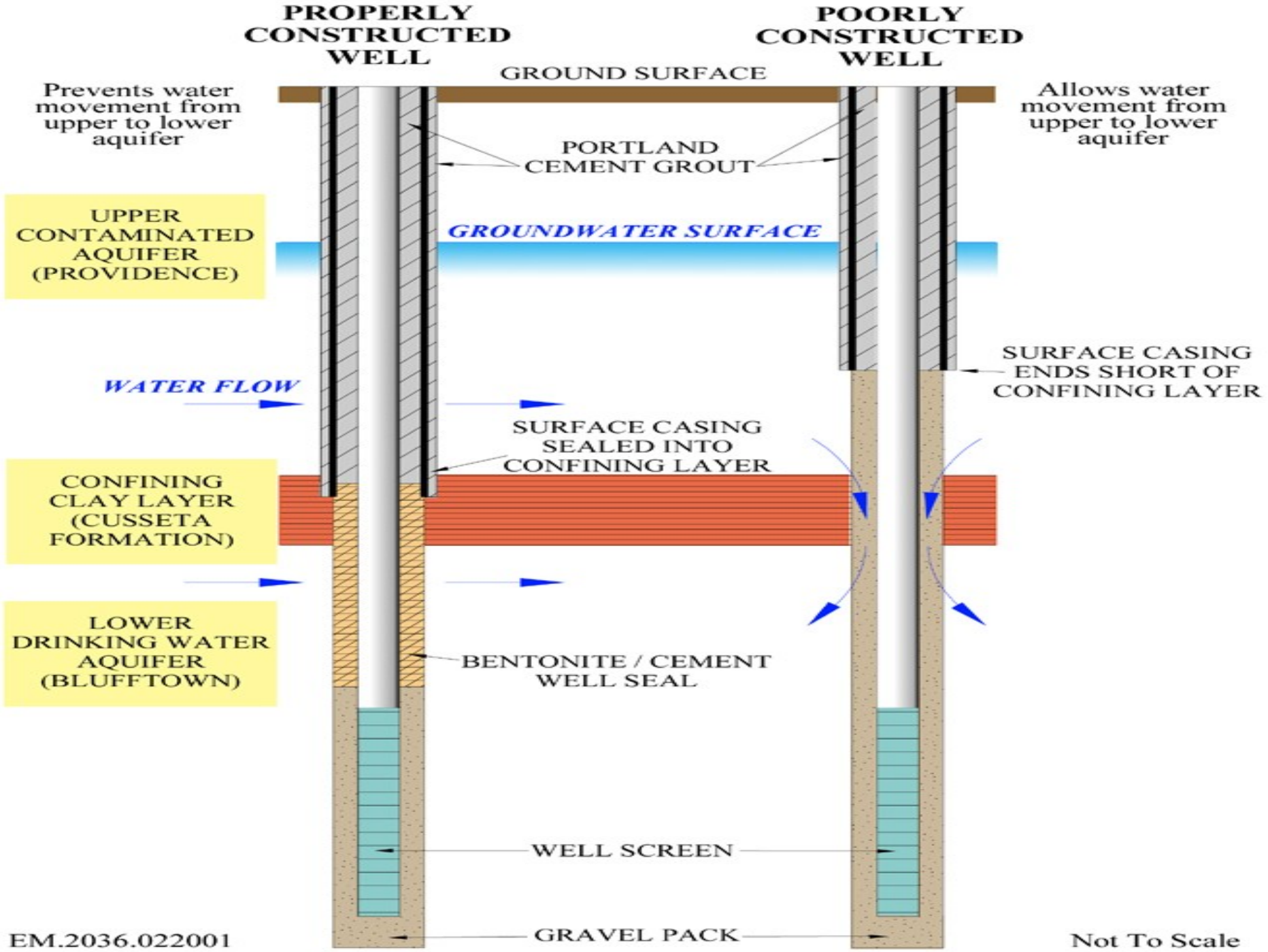
- Complete fencing around CZ
- Maintain a current contaminant source inventory
- Annual WHPP reviews
- Add well-specific contingencies to Base Civil Engineering Contingency Plan

Water Supply Well #7
Robins Air Force Base

Mr. Kevin Long
Chief, Compliance
and Restoration Division
WR-ALC/EMQ

Water Supply Well #7

- TCE plumes from Bldg. 645 and AAFES gas station are close to well
- Well has been secured to prevent cross contamination
- Well will be decommissioned


PROPERLY CONSTRUCTED WELL
POORLY CONSTRUCTED WELL
GROUND SURFACE
Prevents water movement from upper to lower aquifer
Allows water movement from upper to lower aquifer
PORTLAND CEMENT GROUT
UPPER CONTAMINATED AQUIFER (PROVIDENCE)
GROUNDWATER SURFACE
SURFACE CASING ENDS SHORT OF CONFINING LAYER
WATER FLOW
SURFACE CASING SEALED INTO CONFINING LAYER
CONFINING CLAY LAYER (CUSSETA FORMATION)
LOWER DRINKING WATER AQUIFER (BLUFFTOWN)
BENTONITE / CEMENT WELL SEAL
WELL SCREEN
GRAVEL PACK
EM.2036.022001
Not To Scale

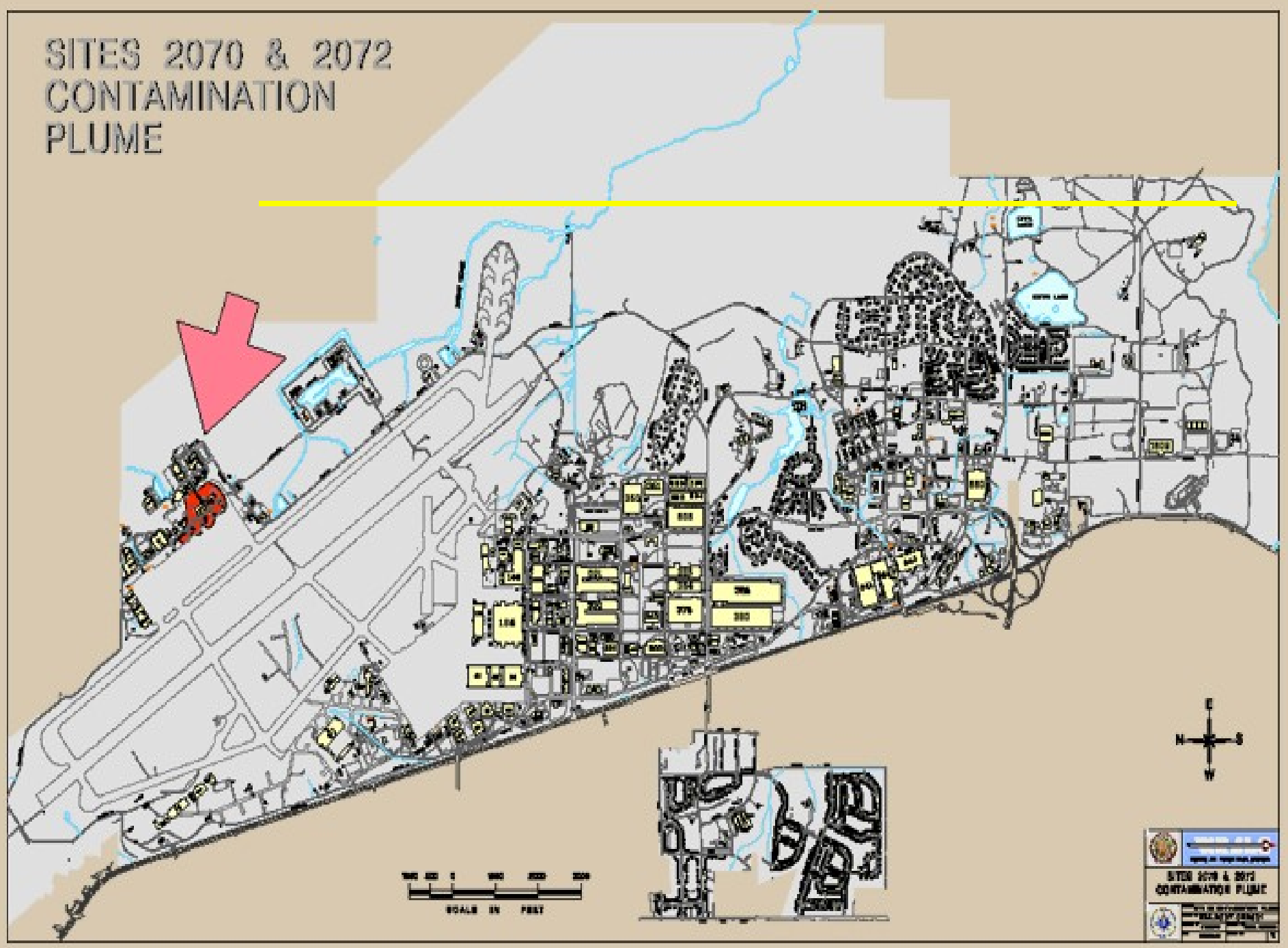
Building 2070/2072 Fuel Hydrant System

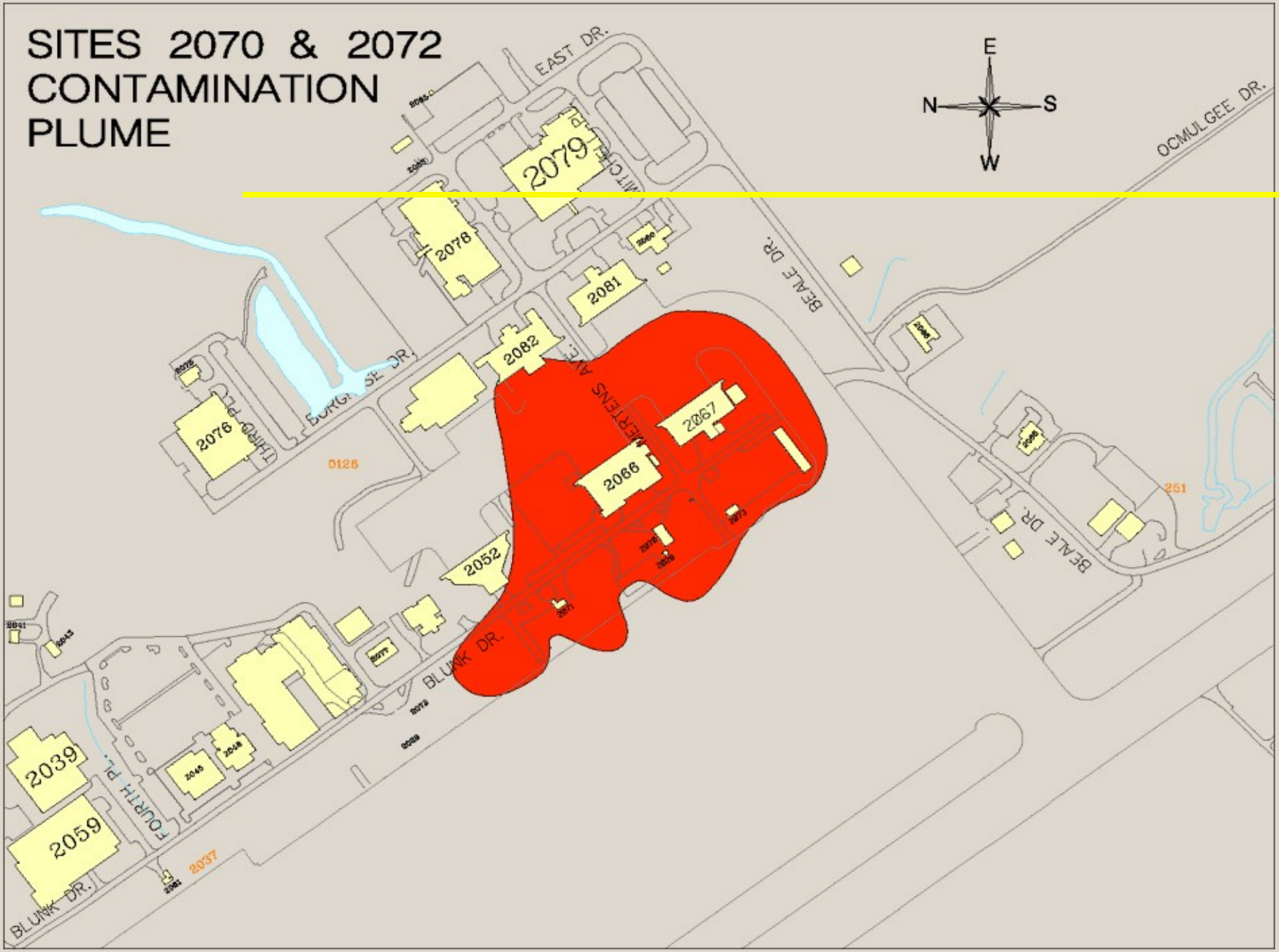
Mr. Paul Barker
UST/AST Program Manager
WR-ALC/EMQ

Site 2070/2072

- Brief history of the site
- Corrective Action Plan (CAP)
- Past remediation techniques
- Future plans

SITES 2070 & 2072 CONTAMINATION PLUME




SITES 2070 & 2072
CONTAMINATION
PLUME
E
N
S
W
EAST DR.
OCMULGEE DR.
BEALE DR.
BLUNK DR.
FOURTH PL.
2079
2078
2081
2082
2076
2067
2066
2052
2039
2059
2037
0128
251

Enhanced Biodegradation of Organic Contamination

Dr. James Aldrich
Earth Tech

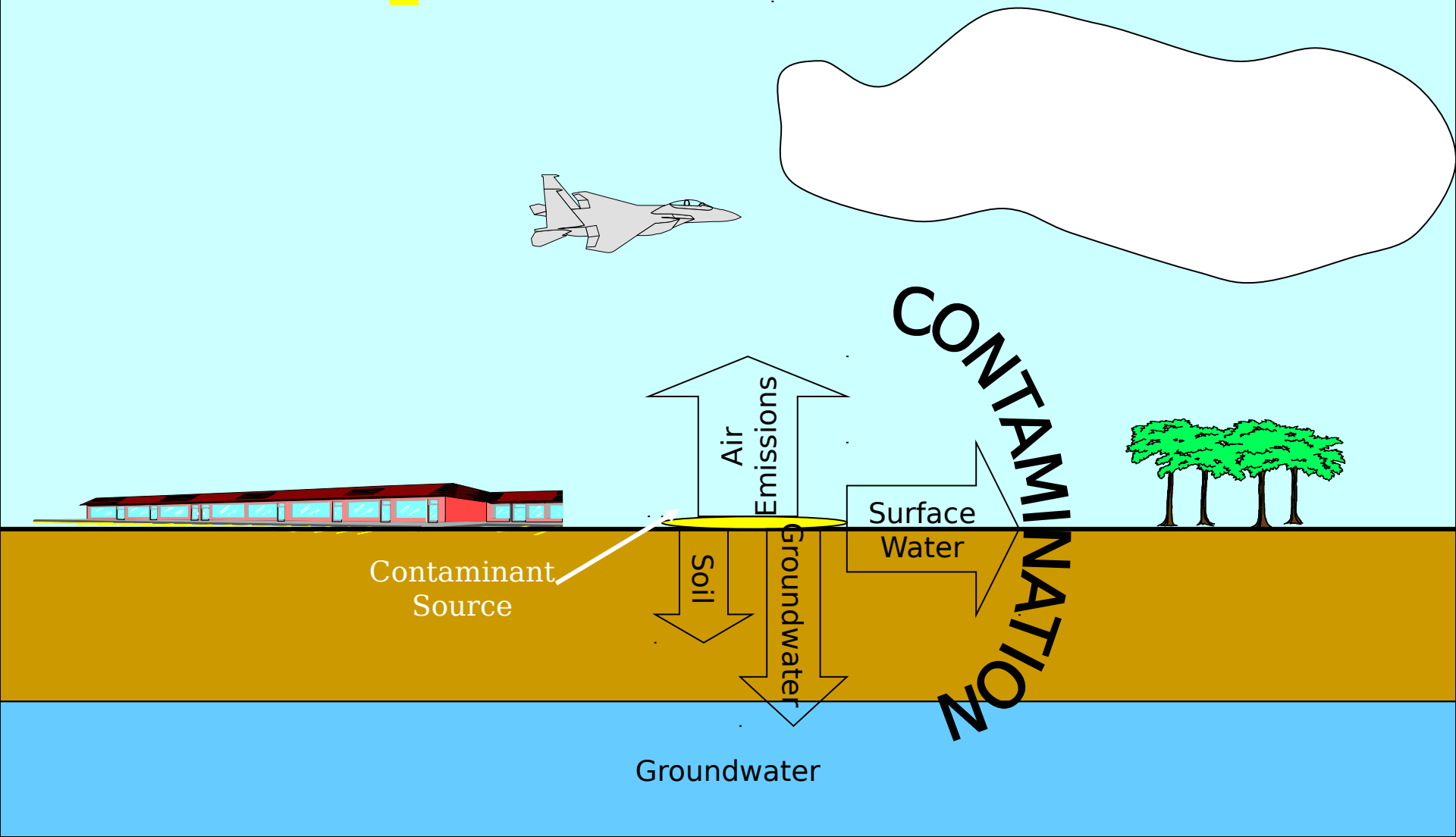
Building 922 - the Army and Air Force Exchange Service Gas Station

Enhanced Biodegradation

There are four questions that need to be answered:

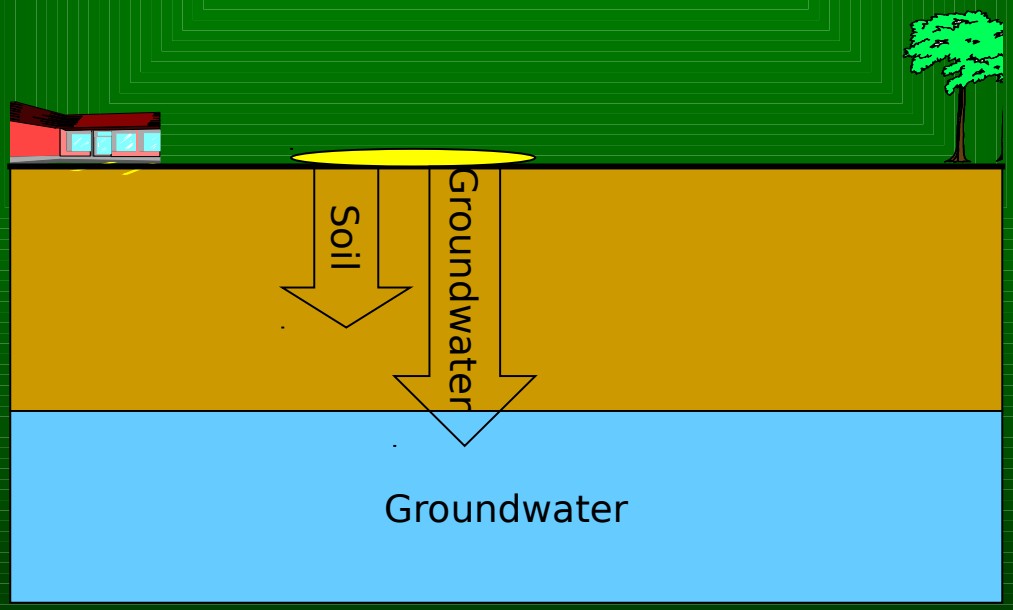
- What kind of contamination are we talking about?
- What is needed for biodegradation?
- How can it be “enhanced”?

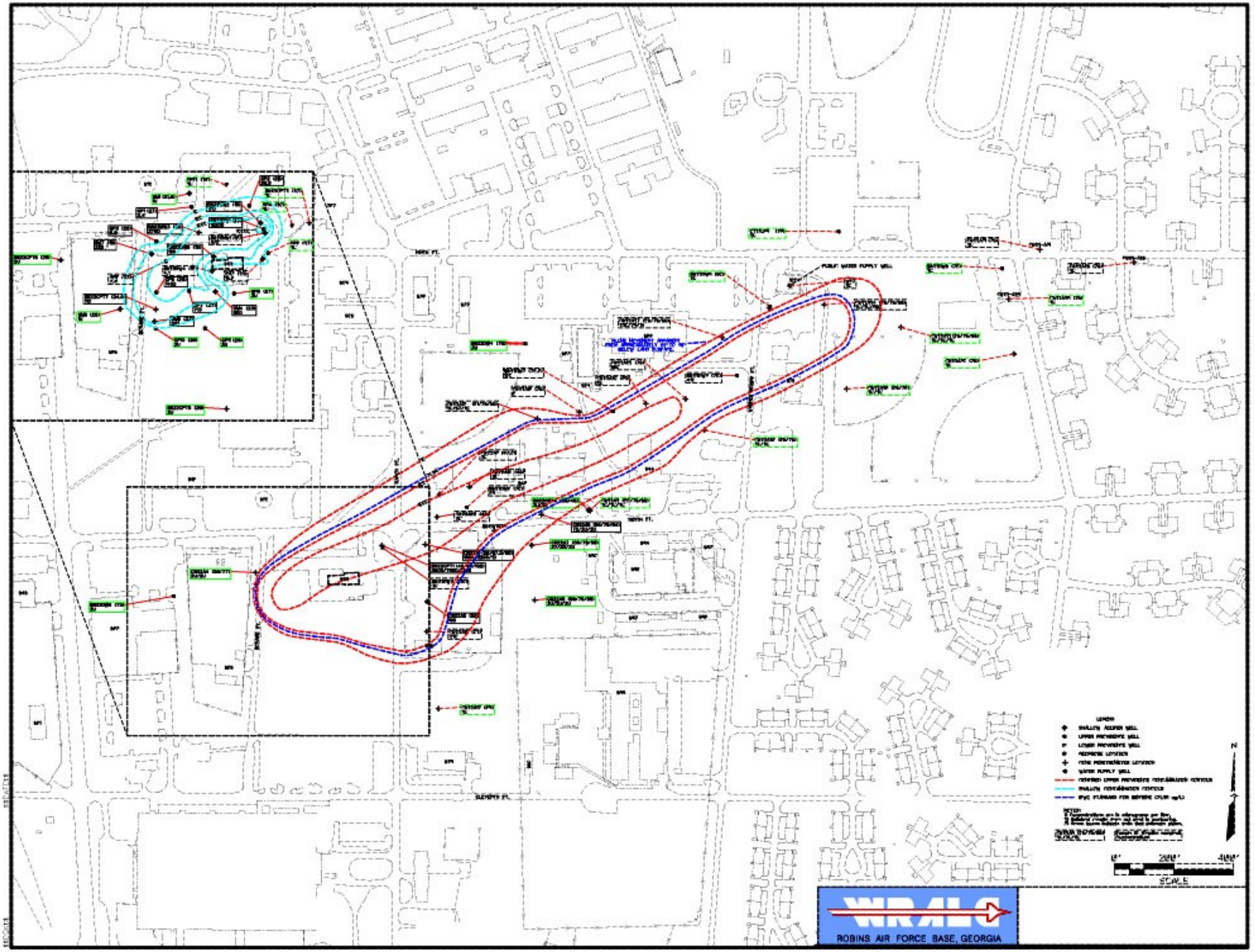
Potential Environmental Impacts from a Site



Enhanced Biodegradation

For Bldg. 922, we are concerned with the soil and groundwater media and the ability for biodegradation to occur

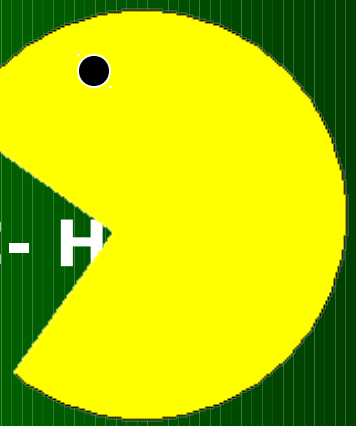



ROBINS AIR FORCE BASE, GEORGIA

Enhanced Biodegradation

What is needed for biodegradation
(or how do we care for and feed "bugs")

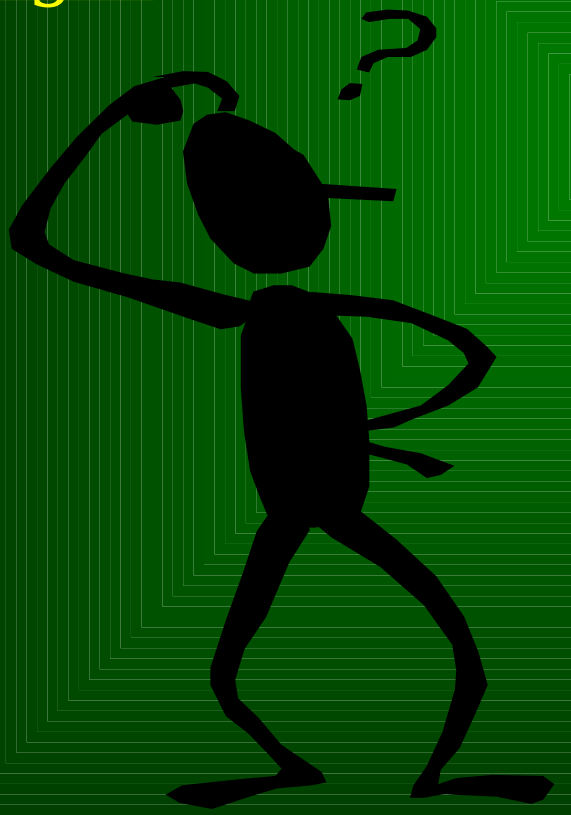
- You have to have bugs (microbes)
- They have to have a nice place to live
- They have to breathe
- They have to have food and water
- They have to have time to eat



If you can take care of their needs, bugs can degrade most organic material to carbon dioxide and water

Enhanced Biodegradation

Do we have bugs?

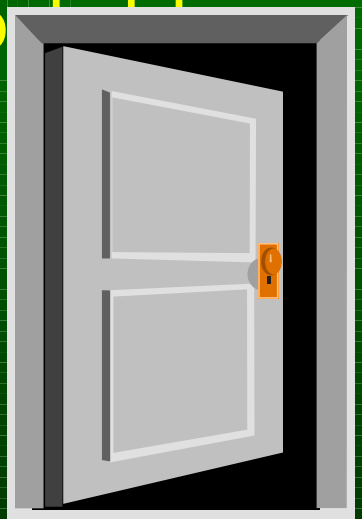


- Each site is unique, but we can look for naturally occurring degradation
- Generally, microbes are ubiquitous - it's just that they may be dormant
- If there was no degradation, the plumes would be further from the source than they

Enhanced Biodegradation

Do they have a nice place to live?

- Bugs are pretty forgiving
- Except for extremes of temperature and pH, they will live almost anywhere
- The key is that we have to make them comfo

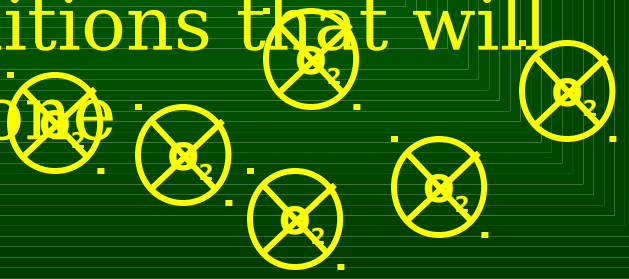


Enhanced Biodegradation

<u>They have to be able to “breathe”</u>

O_2 O_2 O_2 O_2 O_2

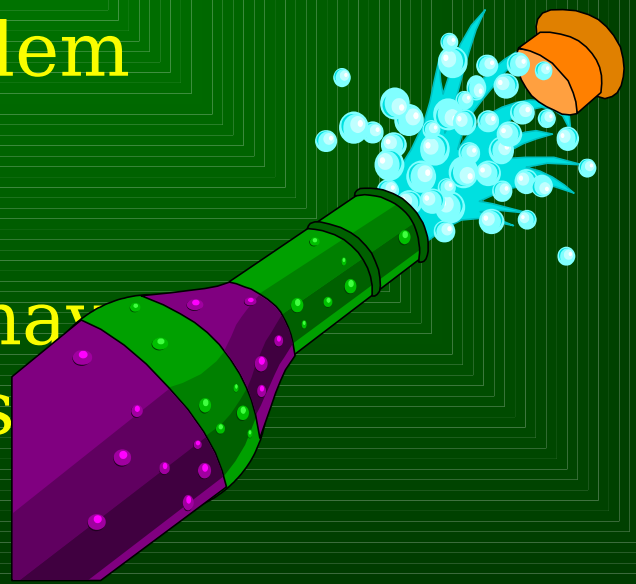
- Again, bugs are pretty forgiving
- Some need oxygen (aerobes), some can’t have oxygen (anaerobes), and some just don’t care (facultative)
- Aerobic degradation is generally faster, but sometimes anaerobic is better
- We have to provide the conditions that will let them do what we want done



Enhanced Biodegradation

They have to have food and water

- The contamination generally serves as the carbon source and petroleum is ideal
- Water is not normally a problem
- Nitrogen generally must be provided
- Phosphorus and potassium may may not be limiting nutrients



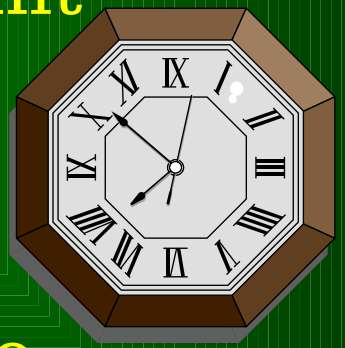
Enhanced Biodegradation

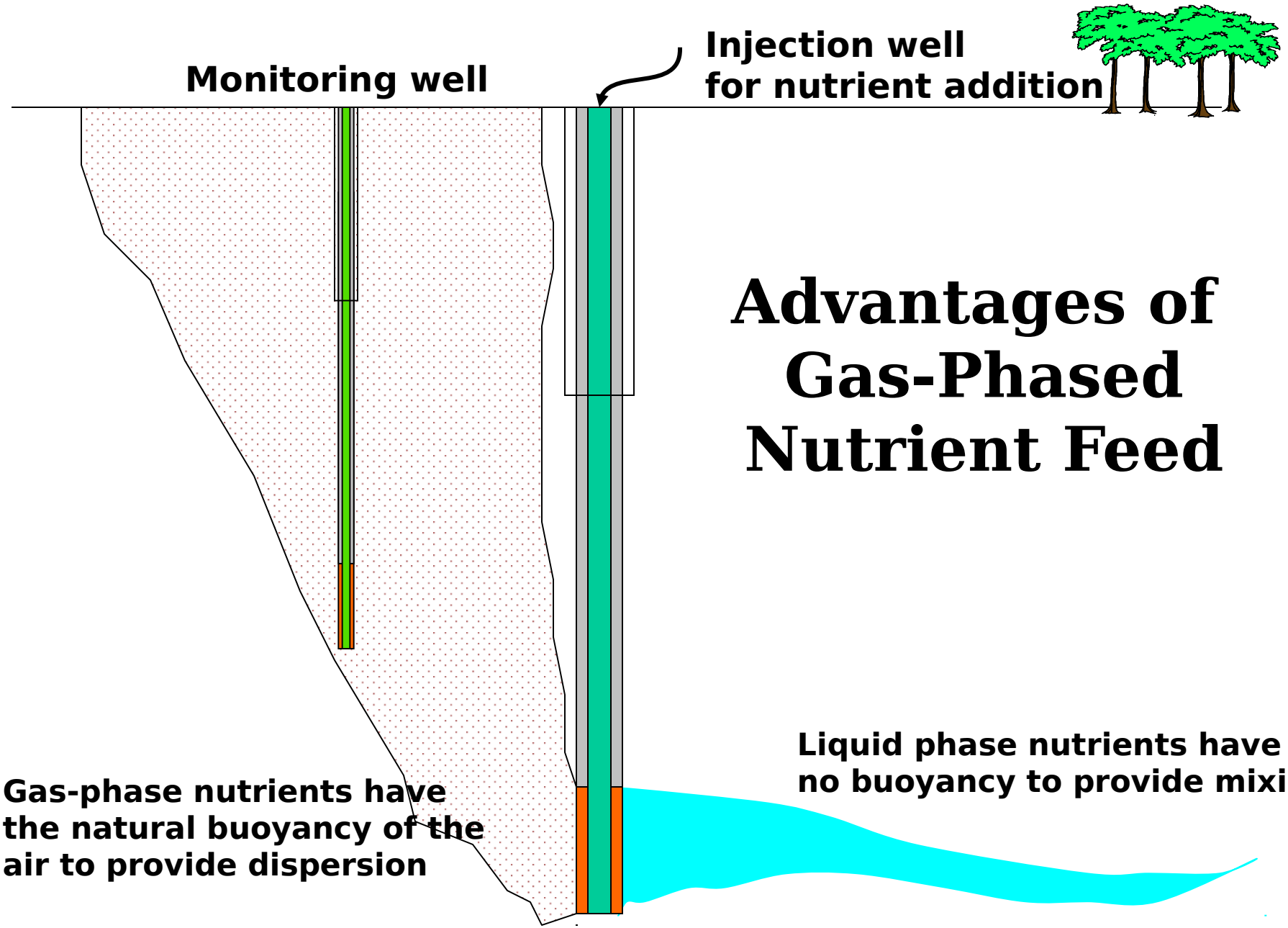
They have to have time to eat

- Nearly any organic contaminant can be degraded- but factors such as the availability of oxygen, nitrogen can limit how fast it can occur

How can it be “enhanced”?

- Feeding bugs is nothing new
- There are three potential problems to overcome:
  - Getting the food to the bugs
  - Getting enough food to the bugs

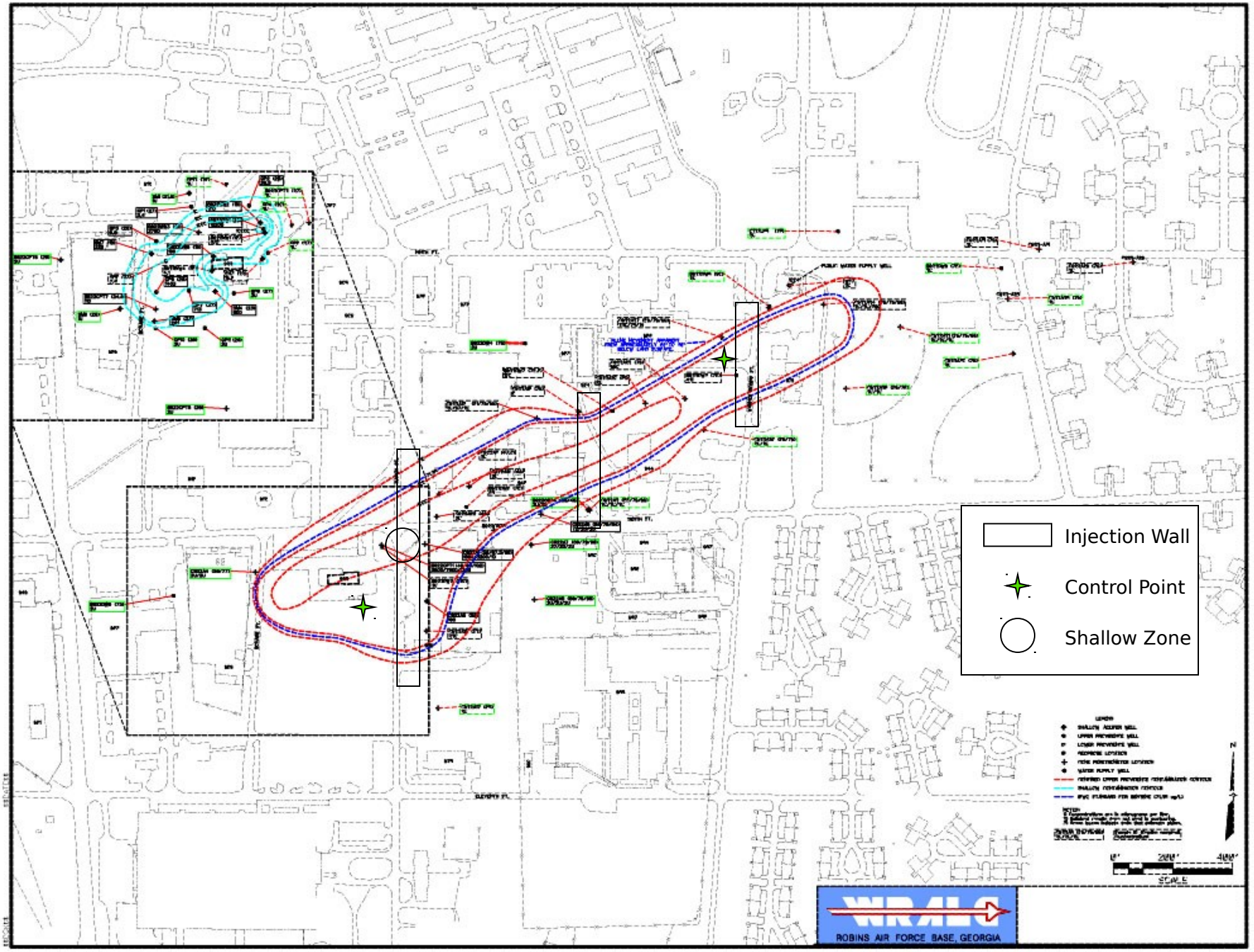



Monitoring well
Injection well
for nutrient addition
Advantages of
Gas-Phased
Nutrient Feed
Liquid phase nutrients have
no buoyancy to provide mixing
Gas-phase nutrients have
the natural buoyancy of the
air to provide dispersion

Enhanced Biodegradation

Why is it ideal for the Building 922 site?

- We know there are bugs present
- The petroleum is an ideal food source
- The soil is quite sandy and very permeable
- The feed rates can be controlled
- The groundwater flow rate is high enough to change a 30 year monitoring program into a 2-3 year clean-up


Injection Wall
Control Point
Shallow Zone
ROBINS AIR FORCE BASE, GEORGIA

Proposed Corrective Action Plans for the Greater Base Industrial Area

Mr. Mike Breazeale
Restoration Project Manager
WR-ALC/EMQ

Proposed Corrective Action Plans For The Greater Base Industrial Area

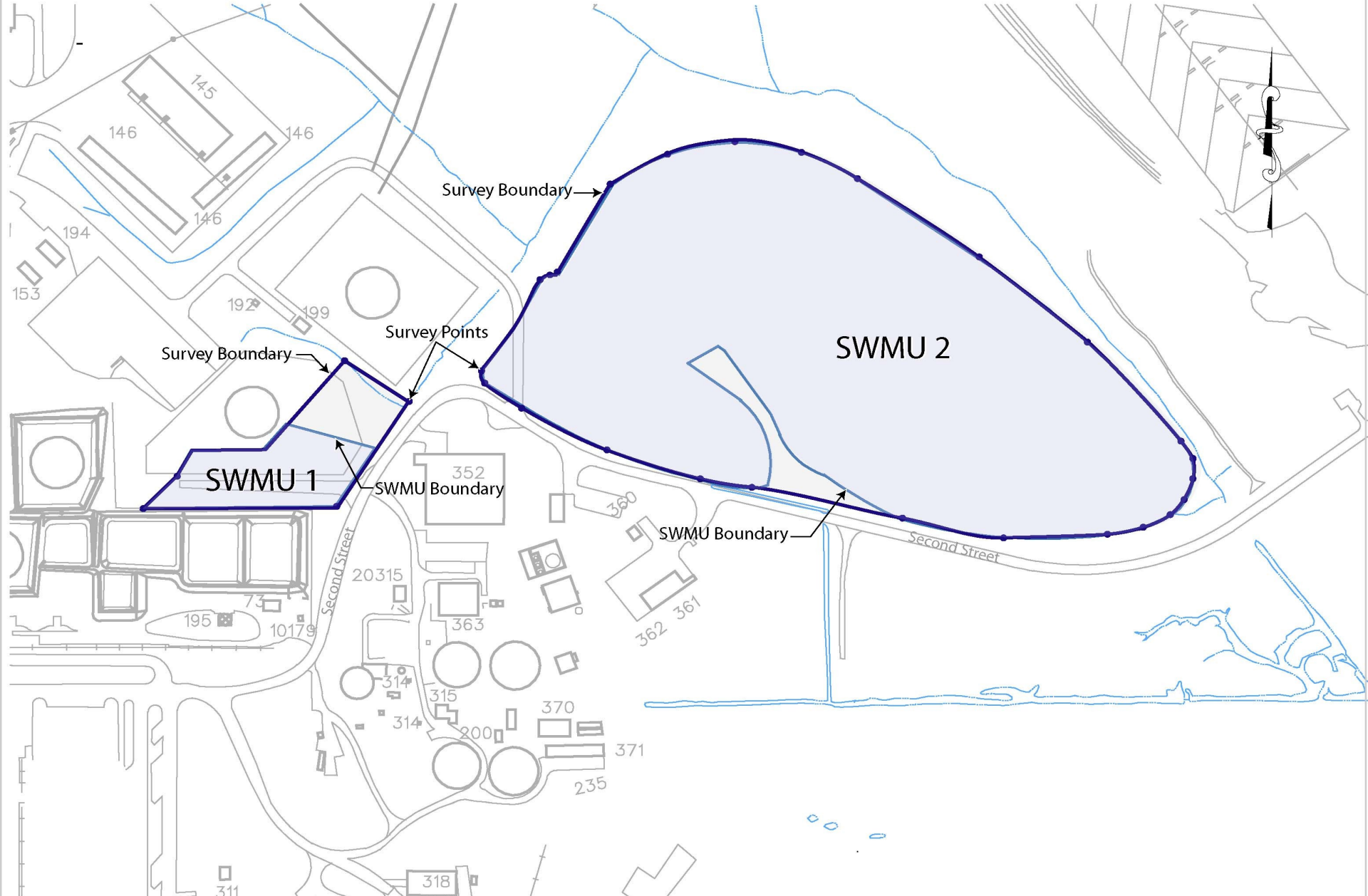
- SWMU 1 and 2
- SWMU 37, 38, and 39
- SWMU 40 and Old Wet Wing Area
- SWMU 10B and 55
- SWMU 57
- SWMU 61
- SWMU 20

Proposed Corrective Action Plans For The Greater Base Industrial Area

SWMUs **1 and 2:**

- Institutional Controls

SWMU 1 & 2


Survey Boundary
Survey Points
Survey Boundary
SWMU 1
SWMU Boundary
SWMU 2
SWMU Boundary
Second Street
Second Street
145
146
146
146
194
153
192
199
352
360
20315
73
195
10179
363
362
361
314
315
314
370
200
371
235
318
311

Proposed Corrective Action Plans For The Greater Base Industrial Area

SWMU 37, 38, and 39

- Institutional Controls

SWMU 40 and Old Wet Wing Area

- SWMU 40 (Building 140) - Institutional Controls
- Old Wet Wing Area - Soil Vapor Extraction

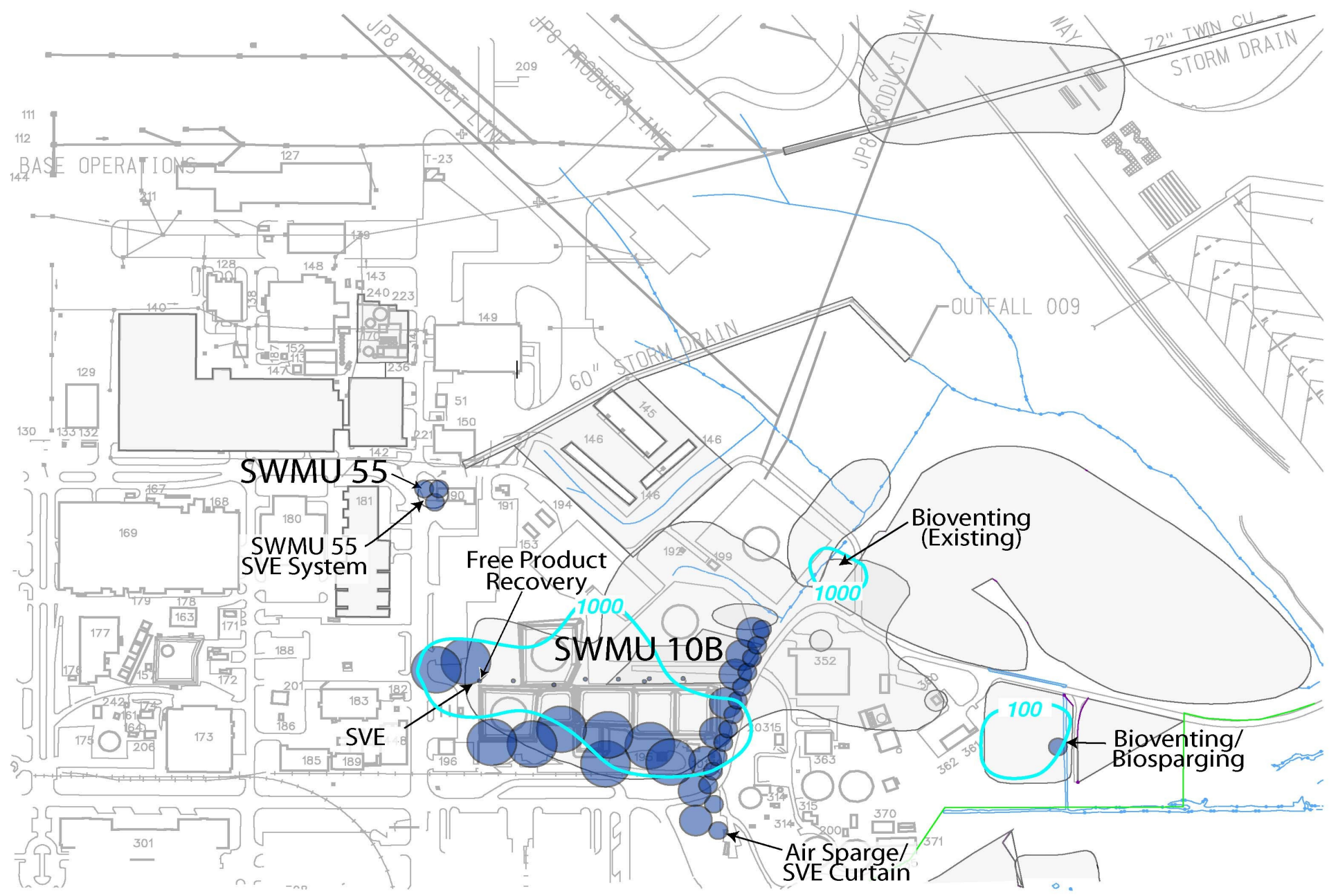
SWMU 37, 38, 39 & 40

Proposed Corrective Action Plans For The Greater Base Industrial Area

SWMU 10B and 55:

- Free Product Recovery
- Soil Vapor Extraction and Air Sparging Systems
- Bioventing and Monitored Natural Attenuation

SWMU 10B & 55


SWMU 55
SWMU 55
SVE System
Free Product
Recovery
1000
SWMU 10B
SVE
Bioventing
(Existing)
1000
100
Bioventing/
Biosparging
Air Sparge/
SVE Curtain
BASE OPERATIONS
JP8 PRODUCT LINE
60" STORM DRAIN
OUTFALL 009
72" TWIN CU
STORM DRAIN

Proposed Corrective Action Plans For The Greater Base Industrial Area

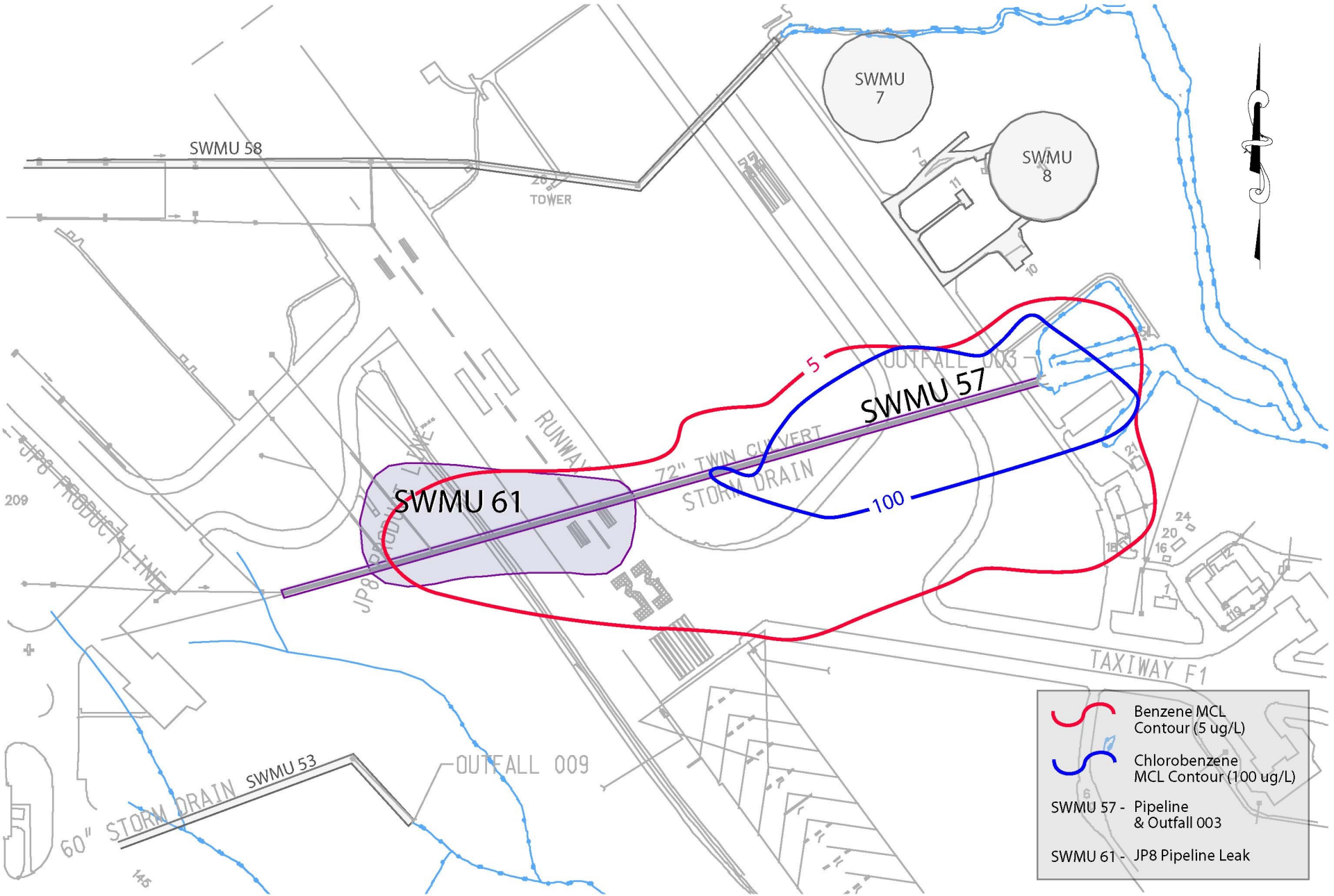
SWMU 57

- Groundwater Extraction and Treatment

SWMU 61

- Combination of Air Sparging and Soil Vapor Extraction
- Bioventing and Monitored Natural Attenuation

SWMU 57 & 61

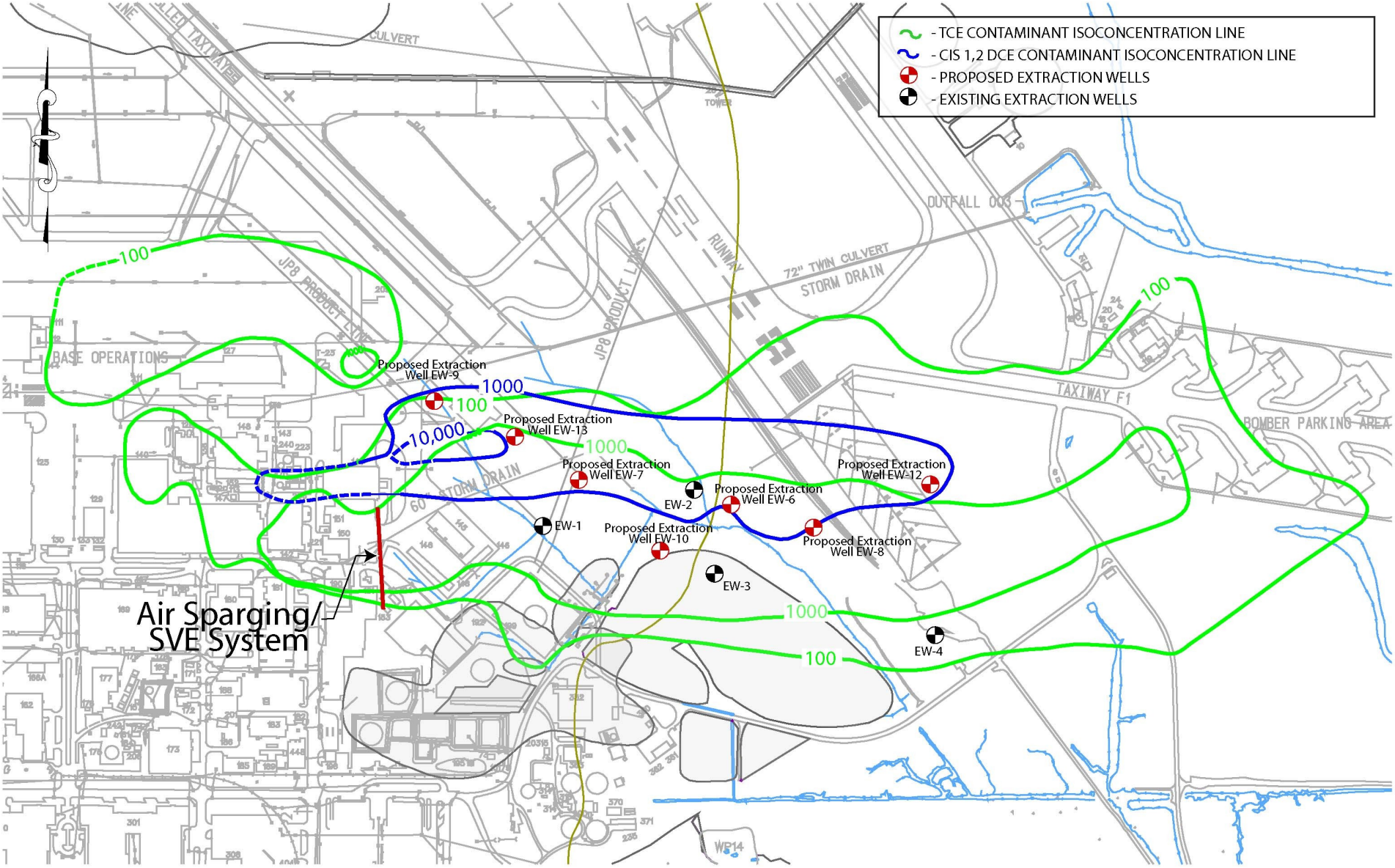

SWMU 7
SWMU 8
SWMU 58
TOWER
5
100
SWMU 57
SWMU 61
72" TWIN CULVERT
STORM DRAIN
OUTFALL 003
RUNWAY
JP8 PRODUCT LINE
TAXIWAY F1
OUTFALL 009
60" STORM DRAIN SWMU 53
Benzene MCL Contour (5 ug/L)
Chlorobenzene MCL Contour (100 ug/L)
SWMU 57 - Pipeline & Outfall 003
SWMU 61 - JP8 Pipeline Leak

Proposed Corrective Action Plans For The Greater Base Industrial Area

SWMU 20:

- Air Sparging/Soil Vapor Extraction
- Groundwater Extraction and Treatment
- Monitored Natural Attenuation

SWMU 20


- TCE CONTAMINANT ISOCONCENTRATION LINE
- CIS 1,2 DCE CONTAMINANT ISOCONCENTRATION LINE
- PROPOSED EXTRACTION WELLS
- EXISTING EXTRACTION WELLS
100
1000
10,000
CULVERT
JP8 PRODUCT LINE
BASE OPERATIONS
72" TWIN CULVERT
STORM DRAIN
OUTFALL 003
TAXIWAY F1
BOMBER PARKING AREA
Proposed Extraction Well EW-9
Proposed Extraction Well EW-13
Proposed Extraction Well EW-7
Proposed Extraction Well EW-6
Proposed Extraction Well EW-12
Proposed Extraction Well EW-10
Proposed Extraction Well EW-8
EW-1
EW-2
EW-3
EW-4
Air Sparging/ SVE System

Air Sparging/Soil Vapor Extraction (SVE) System

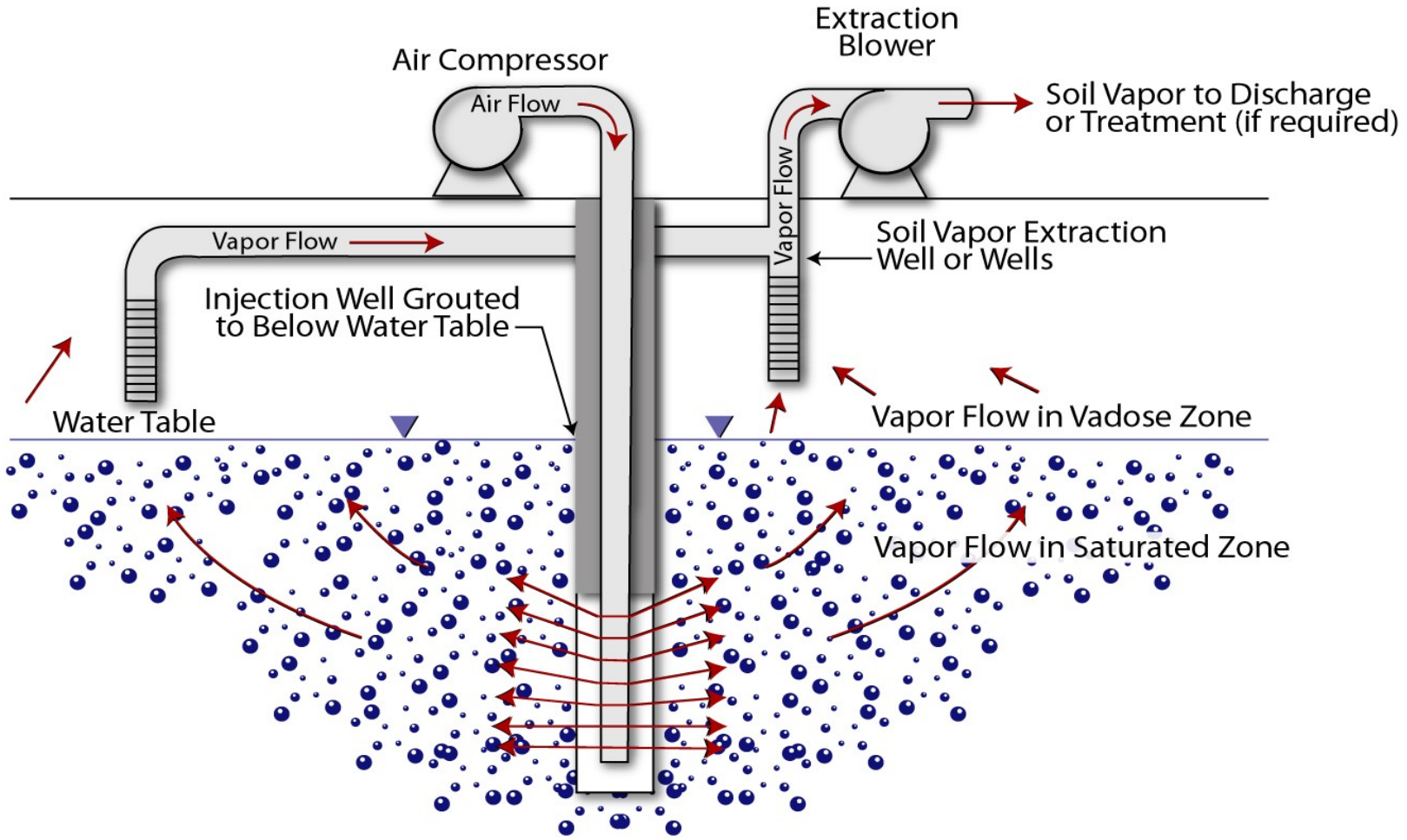
Mr. Brent Jacobs
URS Corporation

Air Sparging/SVE System

Air Sparging:

- In-situ groundwater technology using air injection
- Volatilizes dissolved VOCs from groundwater
- Volatilized VOCs recovered with an SVE system
- Amendments (e.g., nutrients) can be used to enhance biodegradation

Diagram of Air Sparging/SVE System



New Business and Program Closing

Mr. Steven W. Coyle
Installation Co-Chair